

WHAT IS CLAIMED IS:

1. A method of producing an oil body associated with a recombinant multimeric-protein-complex, said method comprising:
 - (a) producing in a cell comprising oil bodies, a first recombinant polypeptide and a second recombinant polypeptide wherein said first recombinant polypeptide is capable of associating with said second recombinant polypeptide to form said multimeric-protein-complex; and
 - (b) associating said multimeric-protein-complex with an oil body through an oil-body-targeting-protein capable of associating with said oil body and said first recombinant polypeptide,

wherein said first recombinant polypeptide is a thioredoxin and said second recombinant polypeptide is a thioredoxin-reductase.
2. A method of expressing a recombinant multimeric-protein-complex comprising a first and second recombinant polypeptide in a cell, said method comprising:
 - (a) introducing into a cell a first chimeric nucleic acid sequence comprising:
 - (i) a first nucleic acid sequence capable of regulating transcription in said cell operatively linked to;
 - (ii) a second nucleic acid sequence encoding a first recombinant polypeptide;
 - (b) introducing into said cell a second chimeric nucleic acid sequence comprising:
 - (i) a third nucleic acid sequence capable of regulating transcription in said cell operatively linked to;
 - (ii) a fourth nucleic acid sequence encoding a second recombinant polypeptide;
 - (c) growing said cell under conditions to permit expression of said first and second recombinant polypeptide in a progeny cell comprising oil bodies wherein said first recombinant polypeptide and said second recombinant polypeptide are capable of forming a multimeric-protein-

complex; and

(d) associating said first recombinant polypeptide with an oil body through an oil-body-targeting-protein capable of associating with said oil body and said first recombinant polypeptide,

- 5 wherein said first recombinant polypeptide is a thioredoxin and said second recombinant polypeptide is a thioredoxin-reductase.

Sub Ave 3. A method of producing in a plant a recombinant multimeric-protein-complex, said method comprising:

- (a) preparing a first plant comprising cells, said cells comprising oil bodies
10 and a first recombinant polypeptide wherein said first recombinant polypeptide is capable of associating with said oil bodies through an oil-body-targeting-protein;

(b) preparing a second plant comprising cells, said cells comprising oil bodies and a second recombinant polypeptide; and

- 15 (c) sexually crossing said first plant with said second plant to produce a progeny plant comprising cells, said cells comprising oil bodies, wherein said oil bodies are capable of associating with said first recombinant polypeptide, and said first recombinant polypeptide is capable of associating with said second recombinant polypeptide to form
20 said recombinant multimeric-protein-complex,

 wherein said first recombinant polypeptide is a thioredoxin and said second recombinant polypeptide is a thioredoxin-reductase.

4. A chimeric nucleic acid sequence encoding a multimeric-fusion-protein, said nucleic acid comprising:

- 25 (a) a first nucleic acid sequence encoding an oil-body-targeting-protein operatively linked in reading frame to;
- (b) a second nucleic acid sequence encoding a first recombinant polypeptide; linked in reading frame to;
- (c) a third nucleic acid sequence encoding a second recombinant
30 polypeptide, wherein said first and second recombinant polypeptide are capable of forming a multimeric-protein-complex, and

wherein said first recombinant polypeptide is a thioredoxin and said second recombinant polypeptide is a thioredoxin-reductase.

5. A recombinant multimeric-fusion-protein comprising (i) an oil-body-targeting-protein, or fragment thereof, (ii) a first recombinant polypeptide and a (iii) second recombinant polypeptide, wherein said first and second recombinant polypeptides are capable of forming a multimeric-protein-complex, and

wherein said first recombinant polypeptide is a thioredoxin and said second recombinant polypeptide is a thioredoxin-reductase.

- 10 6. Isolated oil bodies comprising a multimeric-protein-complex comprising (i) an oil-body-targeting-protein and (ii) a first recombinant polypeptide, said oil bodies further comprising a second recombinant polypeptide, wherein said first and second recombinant polypeptide are capable of forming a multimeric-protein-complex, and

- 15 wherein said first recombinant polypeptide is a thioredoxin and said second recombinant polypeptide is a thioredoxin-reductase.

7. Isolated oil bodies comprising

- (a) a first fusion protein comprising a first oil-body-targeting-protein fused to a first recombinant polypeptide; and
 20 (b) a second fusion protein comprising a second oil-body-targeting-protein fused to a second recombinant polypeptide,
 wherein said first and second recombinant polypeptide are capable of forming a multimeric-protein-complex, and

- wherein said first recombinant polypeptide is a thioredoxin and said second recombinant polypeptide is a thioredoxin-reductase.

8. A cell comprising oil bodies and (i) an oil-body-targeting-protein, (ii) a first recombinant polypeptide and (iii) a second recombinant polypeptide wherein

- (1) said first recombinant polypeptide is capable of associating with
 30 said oil-body-targeting-protein; and
 (2) said first recombinant polypeptide capable of associating with said

second recombinant polypeptide to form a multimeric-protein-complex,
 wherein said first recombinant polypeptide is a thioredoxin and said
 second recombinant polypeptide is a thioredoxin-reductase.

9. A composition comprising isolated oil bodies, thioredoxin and
 5 thioredoxin-reductase.

10. A food product, personal care product or pharmaceutical
 composition comprising the composition of claim 9.

11. The personal care product of claim 10 wherein said personal
 care product reduces the oxidative stress to the surface area of the
 10 human body or is used to lighten the skin.

12. A method of reducing allergenicity of a food comprising the
 steps of:

providing the isolated oil bodies of claim 7; and
 adding the isolated oil bodies to the food, whereby
 15 allergenicity of the food is reduced.

13. A method of treating or protecting a target against oxidative
 stress, comprising the steps of:

providing the recombinant fusion polypeptide of claim 3; and
 contacting the recombinant fusion polypeptide with a target,
 20 wherein the target is susceptible to oxidative stress, thereby
 treating or protecting against the stress.

14. A method for preparing an enzymatically active redox protein
 associated with oil bodies comprising:

a) producing in a cell a redox fusion polypeptide comprising a
 25 first redox protein linked to a second redox protein;

b) associating said redox fusion polypeptide with oil bodies
 through an oil-body-targeting-protein capable of associating with said
 redox fusion polypeptide and said oil bodies; and

c) isolating said oil bodies associated with said redox fusion
 30 polypeptide,

wherein said first redox protein is a thioredoxin and said second

redox protein is a thioredoxin-reductase.

15. A method for preparing a redox protein associated with oil bodies comprising:

- a) introducing into a cell a chimeric nucleic acid sequence comprising:
 - 1) a first nucleic acid sequence capable of regulating transcription in said cell operatively linked to;
 - 2) a second nucleic acid sequence encoding a recombinant fusion polypeptide comprising (i) a nucleic acid sequence encoding a sufficient portion of an oil-body-protein to provide targeting of said recombinant fusion polypeptide to an oil body linked to (ii) a nucleic acid sequence encoding a redox fusion polypeptide comprising a first redox protein linked to a second redox protein operatively linked to;
 - 3) a third nucleic acid sequence capable of terminating transcription in said cell;
 - b) growing said cell under conditions to permit expression of said redox fusion polypeptide in a progeny cell comprising oil bodies; and
 - c) isolating from said progeny cell said oil bodies comprising said redox fusion polypeptide,
- wherein said first redox protein is a thioredoxin and said second redox protein is a thioredoxin-reductase.

16. A chimeric nucleic acid comprising:

- 1) a first nucleic acid sequence capable of regulating transcription in a host cell operatively linked to;
- 2) a second nucleic acid sequence encoding a recombinant fusion polypeptide comprising (i) a nucleic acid sequence encoding a sufficient portion of an oil-body-protein to provide targeting of said recombinant fusion polypeptide to an oil body linked to (ii) a nucleic acid sequence encoding a redox fusion polypeptide comprising a first redox protein linked to a second redox protein operatively linked to;

3) a third nucleic acid sequence capable of terminating transcription in said cell,

wherein said first redox protein is a thioredoxin and said second redox protein is a thioredoxin-reductase.

5 ~~5~~ 17 A transgenic plant comprising the chimeric nucleic acid sequence of claim 16.

18. A plant seed comprising the chimeric nucleic acid of claim 16.

19. A safflower seed comprising the chimeric nucleic acid of claim 16.

10 20. A nucleic acid construct comprising a gene fusion, wherein the gene fusion comprises a first region encoding an oil-body-protein or an active fragment thereof, operably linked to a second region encoding at least one thioredoxin-related protein or an active fragment thereof,

15 wherein the at least one thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

21. A transgenic plant containing a nucleic acid construct comprising a gene fusion, wherein the gene fusion comprises a region encoding an oil-body-protein or an active fragment thereof, operably linked to a region encoding a first thioredoxin-related protein or an active fragment thereof,

20 wherein the thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

22. A transgenic plant comprising a nucleic acid construct comprising a seed-specific promoter operably linked to a gene fusion, wherein the gene fusion comprises a region encoding an oil-body-protein or an active fragment thereof, operably linked to a region encoding a first thioredoxin-related protein or an active fragment thereof, wherein a fusion protein comprising activities of oleosin and the thioredoxin-related protein is produced in a seed of the plant,

30 wherein the thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

23. A method of making a fusion protein comprising a thioredoxin-related activity, the method comprising the steps of:

5 providing a transgenic plant comprising a nucleic acid construct comprising a seed-specific promoter operably linked to a gene fusion, wherein the gene fusion comprises a region encoding an oil-body-protein or an active fragment thereof, operably linked to a region encoding a first thioredoxin-related protein or an active fragment thereof, the gene fusion encoding a fusion protein comprising a thioredoxin-related activity;

10 obtaining seeds from the plant; and recovering the fusion protein by isolating oil bodies from the seeds, wherein the thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

15 24. A method of reducing allergenicity of a food comprising the steps of:

providing a preparation comprising oil bodies associated with a fusion protein, the fusion protein comprising an oil-body-protein or an active fragment thereof and a thioredoxin-related protein or an active fragment thereof; and

20 adding the preparation to the food, whereby allergenicity of the food is reduced due to activity of the thioredoxin-related protein or fragment, wherein the thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

25

25. A composition comprising a fusion protein, the fusion protein comprising an oil-body-protein or an active fragment thereof and a thioredoxin-related protein or an active fragment thereof, in a pharmaceutically acceptable carrier,

30 wherein the thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

26. A cosmetic formulation comprising oil bodies associated with a fusion protein, the fusion protein comprising an oil-body-protein or an active fragment thereof and a thioredoxin-related protein or an active fragment thereof, in an acceptable carrier,

5 wherein the thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

27. A method of treating or protecting a target against oxidative stress, comprising the steps of:

10 providing a preparation comprising a fusion protein, the fusion protein comprising an oil-body-protein or an active fragment thereof and a thioredoxin-related protein or an active fragment thereof; and

15 contacting the preparation with a target, wherein the target is susceptible to oxidative stress, thereby treating or protecting against the stress,

 wherein the thioredoxin-related protein is selected from thioredoxin or thioredoxin-reductase.

28. A nucleic acid construct comprising a gene fusion, wherein the gene fusion comprises a first region encoding an oil-body-protein or an active fragment thereof, operably linked to a second region encoding at least one recombinant polypeptide and an oil-body-surface-avoiding linker in frame between the first and second region polypeptides.

20